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A FLUID SPRAY DEVICE

The present invention relates to a fluid spray device, and more particularly to a nasal spray device of the two-dose type, i.e. containing two doses of fluid to be dispensed.

Spray devices of the two-dose type have been developed for numerous applications, in particular in the field of pharmacy. In particular, such devices are used in the field of nasal sprays. Such a device generally has a reservoir containing two doses of fluid, each dose being intended for a respective nostril.

Depending on the nature of the fluid, particularly when it is medicine, the filling and storage conditions for the fluid can be quite restricting. Thus, in the pharmaceutical field, numerous fluids, i.e. liquids or powders, need to be filled in a sterile zone, and need to be stored in a cold room. Existing spray devices are generally filled with fluid after the device has been fully assembled, thereby implying filling machines that are specially adapted to the devices in question, which machines must naturally be in sterile zones. After filling, the device as a whole must be stored in a cold room. Given the very high costs of surface area in sterile zones and of cubic capacity in cold rooms, the use of specific filling machines turns out to be a drawback in terms of cost, and the same applies to storage in a cold room, since the volume of a nasal spray device is often rather large.

An object of the present invention is to provide a fluid spray device which does not have the above-mentioned drawbacks.

Thus, an object of the present invention is to provide a fluid spray device for which the requirements in sterile-zone surface area during filling, and in cold-room cubic capacity during storage are as small as possible.

Another object of the present invention is to provide such a fluid spray device which is simple and inexpensive to manufacture and to assemble, and which operates in reliable manner.

5 The present invention thus provides a fluid spray device comprising: a body provided with a spray orifice, a reservoir containing the fluid to be sprayed, spray means for spraying one or more doses of the fluid contained in the reservoir; and actuator means for
10 actuating said spray means, said reservoir being closed in sealed manner before the spray device is actuated for the first time, the body including reservoir opening means adapted to open said reservoir while the device is being actuated, said device being characterized in that
15 said reservoir forms a sealed unit that is separate from said body, said reservoir being filled with fluid and being sealed hermetically before it is assembled in said body, and in that said body includes receiver means for receiving the reservoir, and lateral access means for
20 enabling said filled reservoir to be assembled sideways into said body and to be secured therein.

Advantageously, said lateral access means comprise a window provided in a side wall of said body.

25 Advantageously, said lateral access means comprise two diametrically-opposite windows.

Advantageously, said receiver means for receiving the reservoir comprise snap-fastener means for snap-fastening the reservoir in said body.

30 Advantageously, said reservoir is formed by a hollow tube that is closed in sealed manner by first and second plugs disposed in said tube, the fluid being disposed between said first and second plugs.

35 Advantageously, the spray means include an axially-displaceable rod that co-operates with the first plug of said reservoir.

Advantageously, said actuator means include a lateral actuator element that is displaceable in a

direction that is different from the displacement direction of said spray means.

Advantageously, said reservoir opening means include piercing means for piercing the second plug of the reservoir.

Advantageously, the spray means, the actuator means, and the reservoir opening means are assembled to form a unit, the reservoir being assembled in said unit after said reservoir has been filled and plugged.

Advantageously, said lateral access means include a removable cover.

Advantageously, the reservoir contains two doses of fluid, said spray means and/or said actuator means including dose-fractioning means, so that each time the device is actuated, one dose of fluid is sprayed.

Other characteristics and advantages of the present invention appear more clearly from the following detailed description, given by way of non-limiting example, and with reference to the accompanying drawing, and in which:

• Figure 1 is a diagrammatic section view of a fluid reservoir for a fluid spray device constituting an advantageous embodiment of the present invention;

• Figure 2 is a diagrammatic section view of a fluid spray device constituting an advantageous embodiment of the present invention, into which the Figure 1 reservoir can be fitted;

• Figure 3 is a view similar to the view in Figure 2, showing the reservoir secured inside the device;

• Figure 4 is a view similar to the view in Figure 3, after the device has been actuated; and

• Figure 5 is a diagrammatic perspective view of a fluid spray device constituting an advantageous embodiment of the present invention, showing the device and the reservoir separately.

Figure 1 shows a reservoir 20 that is adapted to the fluid spray device of the present invention. The

reservoir forms a sealed unit that is separate from the remainder of the device, and that is advantageously constituted by a hollow tube 21 which is plugged at each end by respective first and second sealing plugs 22, 23.

5 This type of reservoir can be made of glass, or of any other suitable material, and the plugs 22, 23 can be made of elastomer material, or of any other material that is suitable for sealing its content inside the reservoir 20 after it has been filled. This type of reservoir is
10 therefore very small in size, in particular when it contains only two doses of fluid, thereby limiting the sterile-zone surface area needed for filling the reservoirs, and the cold-room cubic capacity needed for storing said reservoirs after they have been filled.

15 Figure 2 is a diagrammatic view of a spray device into which the Figure 1 reservoir can be fitted. The device comprises a body 10 which is provided with a spray orifice 15. The body 10 comprises opening means 11 for opening the reservoir 20, which means could be formed by
20 piercing means for example, such as a needle. The needle 11 is preferably stationary relative to the body 10 and is disposed facing, or connected to, the spray orifice 15, the needle being designed to pierce the second plug 23 of the reservoir 20 while the device is being
25 actuated. The spray device further comprises spray means 30, and actuator means 40 for actuating said spray means. Spraying is an important aspect, in particular for nasal spray devices, which must spray the fluid finely so as to provide optimum therapeutic effectiveness. The spray
30 means 30 advantageously include a rod, or an element that is similar to a rod, that is axially displaceable, and that is adapted to co-operate with the first plug 22 of the reservoir 20 so as to displace said plug axially as a piston inside the reservoir 20. In known manner, the
35 displacement of the first plug 22 inside the reservoir raises the pressure inside said reservoir, and therefore causes the second plug 23 to be displaced towards the

needle 11, until said needle pierces the plug 23 and puts the contents of the reservoir 20 into communication with the spray orifice 15. The actuator means 40 preferably comprise a lateral actuator element, i.e. an element
5 which is displaced in a direction that is different from the direction of displacement of the spray means 30. By way of example, the lateral actuator element 40 can be made as a pivot tab which is mounted on the body 10, and which co-operates with the spray means 30 so as to
10 displace said spray means during actuation. Naturally, different spray and actuator means could be envisaged. In the case of a two-dose device, dose-fractioning means are advantageously provided to split the contents of the reservoir into two doses. The dose-fractioning means can
15 be provided on the spray means 30 and/or on the actuator means 40. The dose-fractioning means are not described in greater detail below since they are not connected directly to the present invention, and since they can be of any form.

20 In the invention, the body 10 includes receiver means 13 for receiving the reservoir, and lateral access means 14. The lateral access means 14 enable the reservoir 20 to be loaded sideways into the body 10, so that the reservoir can be assembled inside the body just
25 before the device is used. The reservoir is thus assembled inside a complete unit formed by the body, the spray means, the actuator means, and the reservoir opening means. The lateral access means advantageously include at least one window 14 made in a side wall of the
30 body 10. The figures show a body 10 including two diametrically-opposite lateral windows 14. The receiver means 13 for receiving the reservoir can be made in the form of snap-fastener means, or of any other suitable means that enable the reservoir 20 to be received
35 securely inside the body 10. Naturally, complementary fastener or abutment means (not shown) can be provided to enable the reservoir to be secured better in the body. A

removable cover (not shown) could possibly be provided for the lateral window(s) 14, which cover can be made in any desirable way.

Loading the reservoir sideways into the body therefore enables a reservoir to be made separately, to be filled, to be plugged hermetically, and then to be stored independently from the remainder of the spray device. The remainder of the spray device can itself be assembled in a non-sterile zone and stored in a location other than a cold room. The reservoir can be assembled inside the body 10 just before the device is used, the contents of the reservoir remaining protected by the sealed plugs 22, 23 until the device is actuated for the first time. Loading the reservoir sideways presents the advantage of making it possible to use lateral actuation with spray means being displaced in axial manner, and to assemble the device as a whole, without the reservoir. Assembly of the device is simplified, and the device itself is also simplified, making a saving in particular of a part that is generally required for pre-assembling the reservoir, when said reservoir is to be assembled axially inside the body. The present invention therefore enables a fluid spray device to be made that is less costly, that operates in reliable manner, and for which considerable savings can be made during filling and storage.

Although the invention is described above with reference to a particular embodiment thereof, any modifications could naturally be applied thereto by a person skilled in the art, without going beyond the ambit of the present invention as defined by the accompanying claims.